Summary Hypothesis for Unintentional Injuries

The occurrence of an unintentional injury to a child is the result of a complex interaction between the innate, genetically determined characteristics of the child, the developmental and behavioral factors to which the child is exposed (especially parenting), the balance between risk and protective factors in the environment, and the socio-cultural factors in his or her community. Therefore, it will be possible to identify and measure the individual factors that interact to result in an increased or reduced risk of injury.

Corollaries to this hypothesis are:

- Prevention of injuries is possible through intervention at multiple points in this interactive network.
- The consequences of injury for the child depend on both the type of injury (e.g., head injury) and interaction between potentially different risk and protective factors in each of these domains.
- Individuals with increased risk of injury are also at increased risk of other high-risk behaviors such as substance abuse, early initiation of sexual activity, and delinquency. Interventions which address the fundamental underlying risk factors for injury may have important effects on these other determinants of morbidity and mortality.

Public health significance: Injuries are the most common cause of death for children and adolescents beyond the first six months of life, the most common cause of serious acquired disability, one of the most common reasons for acute medical care (27/100 children per year), and account for 14% of all medical costs for children and adolescence.

Scientific merit and potential for innovative research: It is clear from the last 3 decades of research that injuries are not randomly distributed in the population, and that the presence or absence of risk in the immediate environment is not enough to explain the occurrence of injury. As a result, many injuries cannot be prevented through simple environmental or product changes. In addition, children and adolescents who are injured are also more likely to engage in other high-risk behaviors that have a major impact on the prevalence of adult disease. To understand the underlying causes of injuries, and to develop more effective interventions, we need to have access to (1) the genetic markers for conditions and patterns of behavior possibly related to risk of injury, (2) the parenting practices to which these children are exposed and study how these affect risk taking behavior and exposure to risky environments, (3) the nature of the physical environment at home and in the community and understand why some children exposed to risks are injured while most are not, and (4) the socio-cultural environment and examine how the norms to which children and families are exposed modify risk taking or risk adverse actions. None of these types of interactions have ever been examined on a large scale in a representative sample of children and families because the data to do such analyses have not been available.

The consequences of injury to children are poorly understood because the backdrop on which these injuries occur has largely not been included in the few studies on long term outcomes of injuries that have been conducted. The most important injuries with implications for long term outcomes are traumatic brain injuries, especially repeated traumatic brain injuries. These same risk factors for injury occurrence can be examined in conjunction with follow-up data on children with traumatic brain injury to determine how outcome is modified by pre-morbid characteristics of the child, family and environment and in turn how the injury affects subsequent development and function. The interaction of newly discovered risk factors, for example Apo E or other genetically determined factors, with the chemical, physical and psychosocial environment has not been examined for their effect on long term recovery from injury.

Justification for a large cohort study: The data to conduct the analyses above can only be derived from a prospective cohort study such as being proposed for the NCS. Retrospective studies will simply not have the information needed. While injuries are very common events, they are a heterogeneous group. The sample will need to be stratified by gender, injury type, and other factors, affecting power and thus requiring a large sample. For example, if we stratify by gender and by type of injury, and want to study a mechanism of injury that accounts for 10% of all medically treated injuries, we would need a cohort of 93,000 individuals to detect a relative risk of injury = 1.3 due to a risk factor present in 10% of the group.

Feasibility: Testing the hypotheses for unintentional injury within the NCS is feasible. Much of the necessary data (e.g., genetic material, parenting practices, development) will be collected to test other proposed hypotheses. Some data will need to be collected specifically for the injury hypotheses, such as characteristics of the physical environment. These measurements are feasible and relatively non-intrusive.

Summary Hypothesis for Intentional Injuries/Aggression

Adolescents who are violent are characterized by chronic physical aggression that begins in early childhood. The development of physical aggression is due to the child's innate biological and genetic characteristics, modified by the chemical, developmental and behavioral factors to which the child is exposed (especially parenting), the balance between risk and protective factors in the physical environment, and the socio-cultural norms of the communities to which the child belongs.

Corollaries to this hypothesis are:

- Prevention of violence is best addressed through intervention on early childhood precursors of violence.
- Individuals with violent and aggressive behavior are also at increased risk of other high-risk behaviors, such as substance abuse, early initiation of sexual activity, and school dropout. Interventions that address the fundamental underlying risk factors for aggression and violence may have important effects on these other determinants of morbidity and mortality.

Public health significance: Approximately 4% of children have high levels of chronic physical aggression from infancy to late adolescence. These children are at high risk of causing injuries to others, and at high risk of many other co-morbid mental health conditions such as Oppositional Defiant Disorder, Attention-Deficit/Hyperactivity Disorder, Conduct Disorder, school failure, substance abuse, depression, unemployment, spouse abuse, child abuse, and suicide. Although most children substantially reduce the frequency of physical aggressions with age, more than 50% continue to use some forms of physical aggression during the school years.

Scientific merit and potential for innovative research: Prior longitudinal studies have shown that there is remarkable continuity in behavior over time and that virtually all individuals who are violent and aggressive as adolescents and adults had behavior problems in childhood. The interventions which appear to be most successful in preventing violent adolescents and adults are those begun in the first few years of life. However, the effect size for these interventions is relatively small, and our current ability to accurately target resource intensive interventions to high-risk children is poor. The proposed study offers the chance to obtain the information necessary to develop more effective, and better targeted interventions. It will offer the ability to understand the interaction of chemical exposures (such as heavy metals during pregnancy and early childhood), genetics (such as the functional polymorphism in the gene encoding Monoamine Oxidase A which was recently found to moderate the effect of maltreatment), parenting, and the community environment (such as the effect of collective efficacy on adolescent violence in Chicago neighborhoods). None of these interactions have ever been examined on a large scale in a representative sample of children and families.

Justification for a large cohort study: A major problem with this field of research is that all prior studies had relatively small samples, most did not start during pregnancy, most did not measure physical aggression during the preschool years, and each assessed only part of the risk factors. We need a large-scale longitudinal study, which will measure the developmental course of physical aggression from infancy to late adolescence, and measure all the putative risk factors from pregnancy onwards to study the interplay among the factors. In addition, nearly all prior studies have focused exclusively on males and few data on females are available.

Feasibility: The aggression hypotheses can be tested with the whole sample. However some sub-studies could be done on high risk samples, i.e., parents with a history of behavior problems. Frequency of contact should mirror rate of developmental change, being more frequent during early childhood than later school years. Extensive measures of child characteristics (cognitive, social, behavioral), parenting (styles, supervision) and parent characteristics (mental health, personality, behavioral), family characteristics (psychosocial indices: cohesion, chaos, etc.), and environmental risk indices (home, neighborhood) will be needed.

Summary Hypothesis Child Maltreatment

Hypotheses for violence/child maltreatment: a) Occurrences of child maltreatment are influenced by characteristics of the parents, child, and family, as well as exposure to stressful or supporting circumstances of the environment; b) child maltreatment has serious consequences for children's development, which will be moderated by characteristics of the maltreatment incident, child, family, physical and social environment, and any intervention.

Corollaries to these hypotheses are:

- Characteristics of the parents, child, family, and environment will influence occurrences of child maltreatment, either singly or in combination.
- The severity, chronicity, timing, and type of maltreatment will influence children's developmental outcomes. Maltreatment occurring early in a child's life is likely to be most damaging.
- Interventions occurring early in the child's life are more likely to be efficacious and cost-effective.

Public health significance: Child maltreatment is associated with child fatalities and other adverse developmental outcomes, including increased risk for suicide, aggression, youth violence, intimate partner violence, academic problems, substance abuse, depression and anxiety, risky sexual behavior, conduct problems and delinquency, unstable work histories, illness, and injury-prone behaviors. It is conservatively estimated from official records that approximately one million children experience child maltreatment each year. The annual financial cost of child maltreatment has been estimated at $94 billion.

Scientific merit and potential for innovative research: Four decades of research using retrospective and cross-sectional designs has identified a number of factors associated with occurrences of child maltreatment, but has failed to identify causal mechanisms or reliable early indicators that could guide prevention efforts. Although child maltreatment and exposure to other violence tends to have serious consequences for many children, other children appear to be surprisingly resilient. To document the "natural history" of child maltreatment and to understand how environmental, child, and parent characteristics influence occurrences of child maltreatment and subsequent child development, large-scale prospective longitudinal research, such as the NCS, is required.

The ability to identify early markers of problematic parent-child interactions and factors that contribute to the likelihood of child maltreatment across different stages in children's and families' lives will provide invaluable information for the timing and delivery of cost-effective services to prevent child maltreatment. The measures developed for the study and the knowledge gained will enhance early detection of risk for child maltreatment and adverse child outcomes. The NCS also can provide information about the timing, dosage, and content of interventions necessary to address the consequences of child maltreatment and facilitate healthy child development through the study of interventions occurring within the sample and through using the NCS cohort as a control group in prevention and intervention research involving independent samples.

Justification for a large cohort study: The data to test the hypotheses above can only be derived from a prospective cohort study such as being proposed for the NCS. Retrospective or cross-sectional studies will simply not have the information needed. To examine the impact of different types of child maltreatment, some of which have low prevalence rates in official records (e.g., 0.4% for boys experiencing sexual abuse), in addition to characteristics of the incidents and cumulative impacts, requires the large sample. The large sample also is needed to collect adequate data for conducting analyses of the various naturally occurring prevention and intervention approaches to determine their cost-effectiveness.

Feasibility: Testing the hypotheses child maltreatment within the NCS is feasible. Much of the necessary data (e.g., genetic material, parenting practices, child development, characteristics of the physical environment) will be collected to test other proposed hypotheses. Some data will need to be collected specifically for the child maltreatment and prevention efficacy hypotheses, but have great potential benefit for improving ability to prevent child maltreatment. In addition, a subset of the data related to these hypotheses would be collected only in subsamples in which child maltreatment occurs (e.g., information related to intervention, child attributions and coping following traumatic violence exposure).